Impact of Treatment Information on Views of Treatment Options for Adults with Depression

Undergraduate Honors Research Thesis

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by

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Abstract

Understanding how people respond to information about treatment options is imperative for informing efforts to promote treatment initiation and adherence. The present study examines the impact of informational treatment videos on treatment naive participants' views of treatment credibility, expectations, and prognostic pessimism. U.S. adults (N = 300) with elevated depressive symptoms and no history of treatment for depression were randomly assigned to one of four conditions: (1) a video with information about cognitive behavioral therapy (CBT); (2) a video with information about antidepressant medication (ADM); (3) a video with information about the combination of ADM and CBT; and (4) a control group not shown a video. Primary outcome variables included participants' self-reported credibility, expectations, and prognostic pessimism measured before and after watching any video to which they were assigned. Compared to the control condition, videos describing either single treatment alone enhanced expectations and credibility for that treatment (with the exception of ADM expectations, which did not differ significantly). Those shown the CBT only video reported the most positive expectations and highest credibility for CBT. Those shown the ADM only video reported the most positive expectations and credibility for ADM. Those who viewed the combined treatment video did not differ from other conditions on any of the dependent variables (with the exception of a significant difference between CBT and combination conditions for expectations of CBT). There were no condition differences in prognostic pessimism. Future research could use informational videos to investigate the effects of other kinds of messaging on the variables examined in this study, as well as treatment seeking, adherence, and treatment outcomes.

Keywords: depression, treatment options, expectations, credibility, prognostic pessimism, preference, personalization

Impact of Treatment Information on Views of Treatment Options for Adults with Depression

Major depressive disorder, known commonly as depression, is one of the most common mental disorders, affecting hundreds of millions of people around the world (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2018). It is estimated that 17.7 million U.S. adults had experienced at least one episode of depression in 2018 (Substance Abuse and Mental Health Services Administration, 2019). Depression often varies in severity, but it universally results in personal distress and an impairment of functioning. Common symptoms associated with depression are low mood, loss of interest, and suicidal thoughts or actions, contributing to depression being a leading cause of disability and death by suicide (American Psychiatric Organization, 2013; GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2018). Given the considerable functional impairment associated with depression, a large focus of mental health research is devoted to understanding the disorder in order to improve treatment options and their implementation.

Depression is often explained through two levels of analysis: a biological level and a psychological level. The biological level of analysis emphasizes the effect that biological factors such as genetics and brain chemistry have on mental health (Lebowitz & Appelbaum, 2019). A simple understanding of this level is that variation in the regulation of chemicals in the brain may give rise to symptoms, and the use of antidepressant medication (ADM) may improve symptoms by regulating these chemicals. However, it is important to recognize that the biological underpinnings of depression have yet to be fully elucidated. Although often used in drug marketing campaigns, an understanding of depression as simply caused by the abnormal levels of

key neurotransmitters (as suggested by the monoamine hypothesis) does not reflect the current state of the evidence (Liu et al., 2017).

Another important level of analysis is the psychological level, which instead emphasizes factors such as cognition, behavior, and social interactions (Lebowitz & Appelbaum, 2019). Consistent with this level, cognitive behavioral therapy (CBT) is often used to help teach patients skills to address the overly negative thoughts and maladaptive behaviors associated with depression. The psychological level of analysis is important for recognizing how negative thought patterns and self-destructive behavior are often associated with and can contribute to depression. Despite this, this level of analysis tends to de-emphasize the role of neurobiology and genetics in depression, both important factors that are important for understanding depression in its entirety.

It is important to recognize that these levels of analysis are not mutually exclusive. Depression can be understood through both levels of analysis. The importance of both levels might lead one to expect a combination of CBT and ADM could be used to treat depression most effectively. This approach of viewing depression through multiple levels of analysis may be becoming more popular among researchers, as part of an effort to better appreciate the variations and complexities of this disorder (Belmaker & Agam, 2008). Considerable research has examined the relative effectiveness of depression treatments, and the available evidence shows that CBT and ADM are approximately equally effective as acute treatments for depression (Mor & Haran, 2009). However, it is ultimately up to patients to make informed decisions about which treatment or treatments are most appropriate for them. The ability to choose a treatment option is often viewed as important for respecting patients' autonomy, but it also makes it clear that how patients process information about treatment options is important to understand. This study

examined how people respond to information about depression treatments as part of an effort to identify effective ways of promoting treatment seeking, adherence, and positive outcomes.

Choosing a treatment option can be a difficult process, perhaps especially for those who have not had prior experience with depression or other mental illnesses. Treatment naive patients, or people who have never been treated for depression, often consult their primary physicians as a primary source of information on treatment options (Simon et al., 2006). Primary care physicians provide key information about treatment options. However, over the past few decades, the American healthcare system has arguably shifted toward a more biological approach to mental health, with less attention being paid to psychological and social factors (Deacon, 2013). Physicians understandably emphasize the biological factors and biological treatments for depression, but it is unclear how this effects patients' views of other options. In addition, information about these treatments may come from other people or various advertising campaigns, which may not be entirely accurate or include even the most critical information about treatment options. Thus, it is imperative to understand how such messages affect people's views of depression and depression treatment options. Understanding how patients learn about and decide on a course of action regarding treatment is key to helping to ensure that patients can make informed decisions that are likely to be beneficial for them. To help achieve this, this study was designed to examine how U.S. adults responded to information about CBT, ADM, and combination treatment. Responsiveness to messaging has been studied in a few different ways, but some of the key variables that might be influenced by messaging are expectations and credibility regarding specific treatment options.

Expectations and credibility both play a significant role in the therapeutic effects of many interventions. Many studies have found that patient expectations predict treatment outcome for

both physical and psychological illnesses, and further research has attempted to determine what can change expectations and whether such changes improve the effectiveness of treatment (Constantino, Ametrano, & Greenberg, 2012; Goldfarb, 2011; Laferton et al., 2017; Vîslă et al., 2016; Younger et al., 2012). Having positive expectations and viewing a treatment as highly credible predicts a greater willingness to seek it out and may even potentially improve treatment outcomes (Constantino et al., 2012). These findings show that expectations and credibility are key variables to assess in considering how people respond to treatment information. In the context of this study, I examined changes in attitudes following messaging by assessing perceptions of the treatments' credibility and expectations for outcome with the treatment. Evidence from previous research highlighting the predictive validity of credibility and expectations in predicting treatment engagement and outcomes was a core reason for selecting these variables as primary dependent variables in this study.

Another potentially important factor that could be impacted by treatment messaging is prognostic pessimism. Prognostic pessimism is the idea that mental illnesses are permanent, and that treatment is unlikely to effectively treat the disorder. Prognostic pessimism has been studied in research focused on the possible consequences of believing different etiological explanations for depression. Kemp and colleagues (2014) used an experimental design to test the effect of a biological explanation for depression on prognostic pessimism. The researchers had participants who reported a current or past depressive episode complete a bogus test that supposedly measured the levels of different chemicals in the brain. The results of this test were either given back in a way that suggested their symptoms were or were not caused by a chemical imbalance in the brain. Compared to the control condition, feedback that supported the biological explanation worsened prognostic pessimism. In addition, receiving the biological explanation for

depression increased the credibility and expectations of pharmacological treatment compared to psychosocial treatment (Kemp et al., 2014).

In another relevant study, Lee and colleagues (2016) used video-based messaging to explore the impact of etiological explanation on self-stigmatizing attitudes. This study used a video-based messaging strategy similar to that of the present study, randomly assigning participants to view a short and accessible video describing their depressive symptoms being due to biological factors, cognitive behavioral factors, or their combination. However, my research questions differed in some important ways. Whereas the previous study focused on explanations for depression, I focused on providing information about the treatment itself. This allowed me to evaluate messages that likely more closely parallel the kind of messaging that is provided when treatment options are described in a clinical context.

When people receive information about depression treatments, the messages are most often delivered to prospective patients without regard for their initial views or preferences. The advertisement for a new antidepressant or a recommendation that a treatment naive person receives is likely not based on their initial preference, and we know little about how this affects those receiving the message. Patients do typically have an initial preference for a treatment, and there is evidence that receiving treatment based on preference significantly improves initiation and treatment outcome (Kwan, Dimidjian, & Rizvi, 2010; Lin et al., 2005; Raue et al., 2009). While previous work has focused on the role of preference in treatment outcomes, research has yet to focus more specifically on how the effects of receiving messaging that aligns with preferences differs from the effects of messaging that contradicts them. This study aims to address this gap in understanding by determining whether personalizing messaging to one's initial preference improves responsiveness to the message.

The present study was also designed to address how emphasizing the personalization of treatment affects credibility, expectations, and prognostic pessimism. Treatment options are not universally applied to every patient, as mental health professions will often work with their patients to devise a treatment strategy tailored to the patient and their needs. I believe that it is important to examine the effects of emphasizing how each treatment option can be personalized compared to the effects of not providing such an emphasis.

The emphasis on preference, personalization, and information about treatment options themselves clearly distinguishes this study from previous research. Thus, this study builds on previous work in an effort to improve our understanding of how treatment naive patients with depression respond to information on different treatments. By better understanding the consequences of different messaging, we may be able to start to address the estimated 35.2% of adults suffering from depression who do not receive treatment (Substance Abuse and Mental Health Services Administration, 2019), and improve the way that we provide information about treatment to those who need it.

Study Objectives

This study examined how people respond to messages about CBT, ADM, and combination treatment. Participants were randomly assigned to watch a brief (2-minute) video with information about the rationale, experience of participating in, and benefits of one of these treatment options, while a control group received no video. In addition, participants assigned to a video were also randomly assigned to receive a version of the video that did or did not include and emphasis on how that treatment can be personalized (for a total of seven conditions). The objectives of this study are: (1) to examine the impact of providing information on depression treatment options on participants' views (i.e. credibility, expectations, and prognostic

pessimism); (2) to determine the benefits of receiving information that does or does not fit with one's initial preference; (3) to test the effects of emphasizing treatment personalization when providing information about treatment options; and (4) to assess whether the impact of treatment messaging on credibility and expectations is moderated by stigma or beliefs about the etiology of depression.

First, I hypothesized that participants who viewed a video about a treatment option will report higher credibility and expectations for that treatment option as compared to the control condition. Second, I also hypothesized that all participants who watch a video will report lower prognostic pessimism than control. Third, I predicted that initial treatment preference will moderate response to the videos such that those who view a video about a treatment they prefer will experience greater increases in expectancy and credibility than those who do not prefer the treatment they viewed. Fourth, I also predicted that videos that included an emphasis on treatment personalization would lead to greater improvements in participants' expectations and credibility of each treatment option as compared to videos without that emphasis. Fifth, I expected that personal stigma will moderate response to the videos such that the superiority of the CBT condition over control for credibility and expectations of CBT will be highest for participants who reported high personal stigma. Finally, I expected that biological beliefs about the etiology of depression will moderate response to the videos such that the superiority of the ADM condition over control for the credibility and expectations of ADM will be highest for participants who reported high biological beliefs about the etiology of depression.

Methods

Participants

Participants (N=300) were recruited through a Human Intelligence Task (HIT) on Amazon Mechanical Turk (MTurk) via the online software program CloudResearch. MTurk Workers who are 18 or older and have an MTurk HIT approval rating of 95% or higher completed a brief prescreening to determine eligibility. In addition, I instituted a CloudResearch recommended feature to improve data quality by blocking low quality participants who had failed previous attention checks or used suspicious IP addresses. Inclusion criteria were: 18 years of age or older, current U.S. resident, 95% HIT approval rating or higher, evidence of a likely prior experience of depression as indicated by a score of 10 or higher on a version of the Patient Health Questionnaire-9 modified to assess a two-week period when one experienced the highest level of depressive symptoms (PHQ-9; Kroenke, Spitzer, & Williams, 2001), and reporting no prior treatment for depression.

The inclusion criteria were relaxed during the study to facilitate recruitment. Initially, a score of 10 or higher on the original version of the PHQ-9 was required. This requirement was in place for the first 125 participants. The criteria were relaxed to require a score of 10 or higher on the historical version of the PHQ-9, which was in effect for the remaining 175 participants. The historical version of the PHQ-9 assessed depressive symptoms during a two-week period when one experienced the highest level of depressive symptoms rather than only in the past two weeks, as the original version of the PHQ-9 did. The final 175 participants completed both the historical and original version of the PHQ-9.

Once study eligibility had been determined, participants who signed an informed consent document were allowed entry into the study. Participants who incorrectly answered attention check questions included in the questionnaires were also excluded from the study. Participants were randomized to receive a type of informational video on a specific depression treatment

option (with and without and emphasis on personalization) or a control group involving no video.

Measurement / Instrumentation

Prescreening Measures (Pre-Informed Consent)

History of Treatment. Using a single item, participants reported if they had ever taken any medication or participated in a therapy for depression. Participants had to indicate no prior treatments to be eligible to participate.

Patient Health Questionnaire-9 historical version. The PHQ-9 is a brief 9-item self-report questionnaire used in screening for study eligibility. The PHQ-9 was altered to include an assessment of the history of depressive symptoms rather than depressive symptoms within the last 2 weeks. This version of the PHQ-9 asked participants to identify a 2-week period during their lifetime when their depressive symptoms have been most severe and asked: "For the questions that follow, please indicate how often during that 2-week period you were bothered by the following problems." Participants responded on a scale of 0-3 with each value designated as follows: 0-not at all, 1-several days, 2-more than half the days, 3-nearly every day. 125 participants only received the original PHQ-9 for screening purposes, but during data collection I decided to adjust inclusion criteria to include previous depressive episodes in order to improve the rate of recruitment. After this adjustment, the remaining 175 participants received both the historical and original PHQ-9.

Treatment Preference/Willingness to Seek Treatment. Participants were asked about their treatment preference (with the option to select either CBT, ADM, or combination treatment) and their willingness to seek treatment for each option using a 5-point Likert scale.

Study Measures (Post-Informed Consent)

Beliefs about the Etiology of Depression. Personal beliefs about depression etiology were measured using the modified Reasons for Depression Questionnaire (RFD; Addis, Truax, & Jacobson, 1995; Leykin, DeRubeis, Shelton, & Amsterdam, 2007). The modified version was shortened in order to include only especially prevalent beliefs regarding the etiology of depression (Leykin et al., 2007). The RFD is a 14-item scale presenting participants with reasons why they may be depressed. It is scored on a 0-3 Likert scale with options ranging from a 0 for "definitely not a reason" to a 3 for "definitely a reason." Leykin et al., reported the following Cronbach's alphas for the subscales: "Characterological subscale (3 items) = .46, Biological (3 items) = .65, Intimacy (2 items) = .63, Childhood (2 items) = .86, Relationship (3 items) = .91" (Leykin et al., 2007). An example of the childhood subscale is the item: "I am depressed because of certain things that happened to me as a child." A high childhood score would mean that the participant believes their depression is due to childhood experiences. The RFD was presented to participants both before and after experimental manipulation.

Credibility and Expectations for Treatment. The Credibility/Expectancy Questionnaire (CEQ; Borkovec & Nau, 1972) was used as a primary outcome measure to assess expectations of treatment and its perceived credibility. Evidence supports the reliability and validity of the CEQ. Estimates of Cronbach's alpha have been of 0.90 for the expectations portion of the measure and 0.85 for the credibility portion (Devilly & Borkovec, 2000). The CEQ contains two sets of items, the first three items assessing credibility, and the final three items assessing expectations. Participants respond to questions about their thoughts and feelings about a treatment option and its likely success. All three items assessing credibility are scored on a 0-9 Likert scale with options ranging from a 0 for "not at all" to a 3 for "very." Two of the three items for expectations ask about how much improvement in functioning is expected and are

scored on a scale from 0% to 100%. The final item is scored using the same Likert scale as the items assessing credibility. Each participant responded to the CEQ for cognitive behavioral therapy, antidepressant medication, and combination treatment both before and after experimental manipulation.

Depression Stigma. Stigma was measured by the Depression Stigma Scale (DSS; Griffiths et al., 2004). The DSS includes two subscales: Personal Stigma and Perceived Stigma. Each subscale contains the same nine items and either ask participants how strongly they personally agree or how strongly they think most other people agree with each item. According to the Australian National University website, the DSS has continuously shown high internal consistency, with three separate samples showing Cronbach's alphas of 0.77, 0.82, and 0.75 for the Personal Stigma Subscale, and alpha values of 0.82, 0.77, and 0.75 for the Perceived Stigma Subscale (Australian National University Centre for Mental Health Research, n.d.). The two subscales also show evidence of discriminant validity, with the correlation between the Personal and Perceived Stigma Subscales being .12 (Australian National University Centre for Mental Health Research, n.d.). The DSS was presented to participants before and after experimental manipulation.

Patient Characteristics. I included demographic questions including age, sex assigned at birth, current gender identity, race, and total gross yearly household income before taxes.

Prognostic Pessimism. The other primary outcome measure was a 13-item scale assessing general prognostic pessimism, the Perceptions of Depression Scale (PDS; Deacon & Baird, 2009). The PDS consists of items assessing the perceptions of personal responsibility, permanence, and the effects of treatment on depression in order to assess general prognostic pessimism. The scale is scored on a 0-4 Likert scale with options ranging from a 0 for "not at all"

to a 4 for "extremely." A previous study found Cronbach's alpha coefficients of .73 and .68 for the scale in separate analyses (Deacon & Baird, 2009). The PDS was presented to participants before and after experimental manipulation.

Experimental Manipulation

The independent variable in this study was the type of informational video provided to the participants. There were seven conditions that represent messages addressing three treatment options (CBT, ADM, and combination treatment, each presented either with or without a message about how these treatments can be personalized and a control condition involving no video). These brief (2 min) videos were designed to briefly explain what the treatment option involves while highlighting the rational for and benefits of the treatment. None of the videos described the other treatment options in any way. Each video was designed to follow the same structure as well as being equally factual and persuasive. Still images were placed in the background of each slide of the video, making sure that each video had almost exactly the same number of images of people, bullet points, and references to research.

Preface

Each video began with a preface stating "Depression is a common mental health problem. In this brief video, you will learn about one evidence-based treatment for depression, known as [treatment option]." The combination treatment video replaced "one evidence-based treatment for depression" with "a combination of evidence-based treatments for depression, known as cognitive behavioral therapy and antidepressant medication."

CBT Video

The CBT video first explains that CBT is based on a cognitive behavioral model of depression, and that research has shown that a pessimistic outlook and stressful life events may

increase one's risk for depression. A brief description of the experience of working with a therapist follows, noting that this work involves efforts to develop coping skills and learning to apply them on one's own. The video concludes with a statement that not all therapists can provide CBT, while also explaining how CBT can provide symptom relief that can last for many years after treatment.

ADM Video

The ADM video begins with a simple explanation of how research has shown that depression may be associated with a dysregulation of chemical messengers (neurotransmitters) in the brain. This is different from the approach discussed in the introduction, as the video describes an association rather than a claim that depression is simply a result of chemical imbalances. Then the general function of Selective Serotonin Reuptake Inhibitors (SSRIs) are explained, noting that they can be effective, accessible, and easy to use. Finally, I describe some common side effects, noting that one can work with a doctor to manage them effectively, and that the continued use of ADM can provide symptom relief for many years after seeking treatment.

Combination Treatment Video

The combination treatment video begins with a quick explanation of the rationale for CBT and ADM, using the same language as above. After this, the video notes that many factors can contribute to depression, and state how some research has shown that the use of both may bring about faster relief of symptoms than CBT or ADM alone. The end of the video describes how combination treatment does require a larger commitment of time and money than individual treatment, while also having the side effects of medication, but that treatment can provide symptom relief for many years after seeking treatment.

Emphasis on Personalization

Participants who received a version of a video with an emphasis on personalization were told how within each treatment option, they could work with a health care provider to help determine what strategies and options will work the best for them personally.

Procedure

Participants received a HIT through MTurk that contained basic information about the study. The HIT provided them access to a Qualtrics survey. Prior to entry, participants responded to screening measures. If eligible, they will be provided an informed consent document to sign. Upon signing the informed consent document, participants completed the study questionnaires mentioned in the measurement/instrumentation section above. Participants were then randomized to receive an experimental task, either a CBT video, an ADM video, or a video about combined treatment with and without an emphasis on personalization. A control group received no video, for a total of seven conditions. 75 participants received the CBT video, ADM video, combination treatment video, and control video each, with either 37 or 38 participants in each group randomly receiving an emphasis on personalization (with the exception of control, as all 75 received no video). After reviewing any videos, participants responded to another set of questionnaires. Participants received a $1.00 incentive as a payment through MTurk.

Analytic Strategy

The data were analyzed using general linear modeling to test for the effect of treatment on credibility and expectations related to each treatment option (CBT, ADM, and combination treatment) as well as general prognostic pessimism. In order to achieve this, seven models were run, one for each of the dependent variables by treatment condition, controlling for the pre-manipulation level of that same variable. The seven models examined the following dependent variables: credibility of CBT, expectations of CBT, credibility of ADM, expectations of ADM,

credibility of combination treatment, expectations of combination treatment, and general prognostic pessimism. Covariates for these models included the four main levels of condition (CBT video, ADM video, combination video, and control) as well as the baseline scores for each dependent variable.

In addition to overall tests involving condition, I used follow-up tests to evaluate differences between each condition. For between group comparisons, Hedges' g is provided as a measure of effect size. For follow-up analyses of an overall significant effect of condition, Tukey's Honest Significant Difference (HSD) was used to adjust for the multiple tests involved. Additional testing included running models to examine whether participants differed across conditions prior to randomization and paired *t*-tests testing for differences pre- and post-experimental manipulation within the same dependent variable.

For analysis of the potential moderators of condition differences in the dependent variables, the seven dependent variables described above were assessed with the secondary measure subscales as potential moderators. For example, there were seven models run, one assessing each dependent variable (credibility of CBT, expectations of CBT, credibility of ADM, expectations of ADM, credibility of combination therapy, expectations of combination therapy, and prognostic pessimism) with perceived and personal stigma (subscales of the DSS) tested as potential moderators of the condition differences for each dependent variable. This same process was repeated for beliefs on the etiology of depression with subscales of the RFD. To examine the effect of personalization on the dependent variables, I tested for condition differences between participants who received personalization and those who did not. In these analyses, the control condition was removed as they did not receive a video and thus never received an emphasis on personalization. Finally, I tested for the moderation effect of preference to examine whether

receiving a video that matched with one's initial preference enhanced the condition differences between groups. Due to the novelty of these secondary research questions and in light of the number of tests being conducted, these tests are considered exploratory.

Results

Demographics / Participant Characteristics

Prior to performing statistical analyses, I characterized participant demographics and relevant characteristics with descriptive statistics. An overview of these descriptive statistics is presented in Table 1. Participants were aged 19-72 and the majority self-identified as White (n = 234, 78.26%), with Female sex assigned at birth (n = 174, 59.59%), Female gender identity (n = 173, 59.25%), and income below $60,000 (n = 172, 58.90%).

The mean PHQ-9 history score was 16.99 (SD ± 4.79). The mean PHQ-9 score (reflecting current symptoms) was 16.34 (SD ± 4.78). The most common treatment preference was for CBT (n = 143, 47.67%), followed by combination treatment (n = 111, 37.00%), and then ADM (n = 46, 15.33%). Following randomization, the vast majority of participants did not receive a video describing treatment option that they preferred (n = 228, 76.00%). Participant frequencies for preference and match/mismatch are shown in Table 2.

Primary Outcomes

The primary dependent variables of interest in this study were credibility and expectations of different treatment options, as well as general prognostic pessimism. Using regression, I first tested the effect of experimental manipulation on treatment credibility and expectations for the four main conditions of CBT video, ADM video, combination treatment video, and control. Credibility and expectations were measured separately for each treatment option (CBT, ADM, and combination treatment).

Baseline and Post Experimental Manipulation Differences

In the model of credibility of CBT, participants did not differ in credibility of CBT across conditions prior to experimental manipulation ($F(4,295) = 1.10$, $p = 0.3492$), and scores in the CBT condition were significantly higher post experimental manipulation ($t(74) = 3.38$, $p = 0.0011$, g = 0.39). In the model of expectations of CBT, participants did not differ in expectations of CBT across conditions prior to experimental manipulation ($F(3,290) = 0.72$, $p = 0.5396$), and scores in the CBT condition were significantly higher post experimental manipulation ($t(71) = 4.30$, $p < 0.0001$, g = 0.51).

In the model of credibility of ADM, participants did not differ in credibility of ADM across conditions prior to experimental manipulation ($F(3,296) = 0.13$, $p = 0.9433$), and scores in the ADM condition were significantly higher post experimental manipulation ($t(74) = 3.81$, $p = 0.0003$, g = 0.44). In the model of expectations of ADM, participants did not differ in expectations of ADM across conditions prior to experimental manipulation ($F(3,292) = 0.92$, $p = 0.4332$), and scores in the ADM condition were significantly higher post experimental manipulation ($t(73) = 4.70$, $p < 0.0001$, g = 0.55).

Participants did not differ in credibility or expectations of combination treatment across conditions prior to experimental manipulation (credibility: $F(3,296) = 0.39$, $p = 0.7579$; expectations: $F(3,292) = 0.19$, $p = 0.9019$), and scores in the combination treatment condition were not significantly higher post experimental manipulation for either model (credibility: $t(74) = 0.93$, $p = 0.3545$, g = 0.11; expectations: $t(72) = 1.50$, $p = 0.1377$, g = 0.18).

Credibility and Expectations of CBT

In the model of credibility of CBT, there was evidence of significant differences by condition ($F(4,295) = 4.39$, $p = 0.0050$). Significant differences between specific conditions as

identified by Tukey's HSD are shown in Figure 1. Those assigned the CBT video reported higher credibility of CBT when compared to control (g = 0.55), and ADM conditions (g = 0.47). The CBT condition was not significantly different from the combination treatment condition, but further analysis determined that the credibility of CBT reported by those in the combination treatment condition was numerically closer to the ADM (g = 0.09) than the CBT condition (g = 0.38).

In the model of expectations of CBT, there was also evidence of significant differences by condition ($F(4,286) = 5.67$, $p = 0.0009$). Significant differences between specific conditions as identified by Tukey's HSD are shown in Figure 2. The pattern of means was similar to that observed for credibility, but there were some differences in the specific comparisons that were significant. Similar to what was found for credibility of CBT, contrasts showed that those assigned the CBT video reported higher expectations of CBT compared to control (g = 0.64) and ADM (g = 0.50). Unlike what was found for credibility of CBT, those assigned the CBT video reported higher expectations of CBT compared to the combination treatment condition (g = 0.39). As with credibility of CBT, the combination treatment condition was closer to the ADM condition (g = 0.11) than the CBT condition (g = 0.39).

Credibility and Expectations of ADM

In the model of credibility of ADM, there was evidence of significant differences by condition ($F(4,295) = 6.03$, $p = 0.0005$). Significant differences between specific conditions as identified by Tukey's HSD are shown in in Figure 3. Participants in the ADM condition reported higher credibility of ADM than control (g = 0.54) and CBT conditions (g = 0.59). The combination treatment condition was not significantly different from any other condition, but it was closer to the ADM condition than any other (g = 0.21).

In the model of expectations of ADM, there was also evidence of significant differences by condition ($F(4,289) = 4.12$, $p = 0.0069$). Significant differences between specific conditions as identified by Tukey's HSD are shown in Figure 4. Those assigned the ADM video reported higher expectations of ADM when compared to the CBT conditions (g = 0.56). The ADM condition was not significantly higher than any other condition, but it was closer to the combination treatment condition (g = 0.32) than the control condition (g = 0.38).

Credibility and Expectations of Combination Treatment

Condition differences in the credibility of combination treatment were not statistically significant ($F(4,295) = 1.08$, $p = 0.3575$). Similarly, condition differences in expectations of combination treatment were also non-significant ($F(4,289) = 2.07$, $p = 0.1047$).

Prognostic Pessimism

Analysis of the model showed that there was no difference across conditions for prognostic pessimism ($F(4,295) = 0.86$, $p = 0.4623$).

Exploration of Potential Moderators of Condition Differences

Next, I tested potential moderators of condition differences in dependent variables. These analyses examined depression stigma and beliefs about the etiology of depression as potential moderators of condition differences on the primary dependent variables.

Personal and Perceived Stigma

I tested seven models to examine personal stigma and perceived stigma as potential moderators on the effect of condition on the seven outcome variables. There was a significant moderation effect of personal stigma on the effect of condition on credibility of ADM. Examination of this effect suggested that it was driven most strongly by differential effects of ADM and control on ADM credibility as function of personal stigma. To illustrate this aspect of

the model, I used a more focused model of just ADM and control conditions to generate Figure 5. There was a similar significant moderation effect of personal stigma on the effect of condition on expectations of ADM. Examination of this effect suggests that it was also driven most strongly by differential effects of ADM and control on ADM credibility as function of personal stigma. A more focused model of ADM and control conditions was used to illustrate this effect (see Figure 6). Both figures show that stigma appeared to attenuate the effect of the ADM video on ADM credibility and expectations, such that the video had a smaller effect than the control condition at higher levels of stigma.

Beliefs about the Etiology of Depression

Out of the seven models run testing the subscales of the RFD as potential moderators on the effect of condition on the seven outcome variables, there was only one significant interaction identified. Endorsing childhood etiological factors for depression moderated the effect of condition on the credibility of combined treatment. Examination of this effect suggested that it was driven most strongly by differential effects of combination treatment and control conditions. To illustrate this aspect of the model, I used a more focused model of just combination treatment and control conditions to generate Figure 7. As the figure shows, for those who endorsed childhood factors in the etiology of depression more strongly, a larger effect of combination treatment as compared with the control condition was observed. For those who did not endorse childhood etiological factors, the combination treatment resulted in views of the credibility of combined treatment that were more similar to the control condition.

Other Exploratory Analyses: Effects of Personalization and Preference as a Moderator

Personalization

Analysis of the effect of condition by personalization on the seven outcome variables found no significant results (*p*s > .05).

Preference

Analysis of preference as a potential moderator on the effect of condition on the seven outcome variables failed to identify any significant moderating effects (*p*s > .05).

Discussion

In this study, I examined the impact of information about CBT, ADM, and combination treatments on credibility, expectations, and prognostic pessimism. I hypothesized that participants who received a video about a type of treatment option would report higher credibility and expectations of that treatment option than control. The results of this study were partially consistent with that hypothesis. Compared to the control condition, videos describing either single treatment alone (CBT and ADM conditions) enhanced expectations and credibility for that condition relative to the control condition, with the exception of expectations of ADM. Instead, the only significant difference between groups for expectations of ADM was that participants in the ADM condition reported enhanced expectations compared to the CBT group. These findings show a clear relationship between providing information on a treatment option and the credibility and expectations of that treatment option, and this knowledge is important to consider when providing messages about treatment options.

The credibility and expectations of combination treatment did not differ from control for those who viewed the combined treatment option. I want to emphasize that I failed to condition differences for the combination treatment condition in any of the dependent variables in this study, with the exception of the CBT condition reporting significantly higher expectations of CBT compared to the combination treatment condition. However, this lack of differences may

potentially be explained by differences in the persuasiveness of the combination video compared to the other single treatment videos. It is clear that the ADM and CBT videos were persuasive enough to produce a significant effect, but perhaps the result is less persuasive when information from both rationales are provided together.

Another reason why this may be the case is that participants' views of combination therapy may be more complicated than their view of CBT or ADM alone. The mean values of the dependent variables for combination treatment and ADM conditions were almost always more similar to one another than to the CBT group. One explanation for this could be that people associate combination treatment more closely with ADM than with CBT, or perhaps the presence of medication in combination therapy has more of an effect on their expectations and credibility than the presence of therapy. Participants who preferred ADM initially were relatively uncommon, and a close association with ADM and combination treatment may have been driven by those who viewed ADM less favorably also holding similar views about combination treatment. Despite the nonsignificant findings, these responses do provide some insight into participants' views of combination treatment, and which is useful for informing future studies.

Contrary to my hypothesis, prognostic pessimism did not differ across groups, personalization was not found to have a significant impact on the primary dependent variables, and I failed to find any evidence of preference as a moderator of the impact of condition on the dependent variables. While it is important to recognize that I failed to find any evidence for the effect of condition on prognostic pessimism, I suggest that some of the nonsignificant findings may be a result of the limitations of this study, which I will expand on in the limitations section.

Before beginning discussion of the potential moderators of condition differences, it is important to state how the large number of tests suggest any findings must be interpreted with

caution. Despite being exploratory analyses, they provide important insight into the impact of treatment information messaging and the dependent variables of credibility and expectations. Analysis of the moderation effect of stigma found that the superiority of the ADM condition over control for the credibility and expectations of ADM was strongest for participants who reported low personal stigma. I predicted that personal stigma would moderate credibility and expectations of CBT in a way that high personal stigma would strengthen the superiority of the CBT condition over control, my rationale being that those who support CBT believe their depression to be more characterological than a biological illness, and that this would be associated with higher personal stigma. While there was no evidence to support this prediction, I did find that the superiority of the ADM condition over control for credibility and expectations of ADM was strongest for participants with low personal stigma. This may be due to a similar phenomenon in which participants who see depression as being less stigmatized are more readily willing to accept ADM and the accompanying rationale that emphasizes biological factors.

In the exploration of beliefs about the etiology of depression moderation effect, I found that for the credibility of combination therapy, the superiority of the combination therapy condition over control was strongest for participants who reported enhanced childhood beliefs about the etiology of depression. This may be due to participants believing that a depression with its causes situated in childhood is likely to require a treatment that involves targeting both psychological and biological factors. It is interesting that this effect was obtained for credibility but did not extend to expectations of combination treatment. I did not predict this specific moderation effect, but it is relevant for informing the direction of future studies in addition to the other results pertaining to combination treatment.

Overall, this study has shown that there are some clear effects of treatment information messaging on people's expectations and views of the credibility of those treatment options. In addition, responses to message about combination treatment appeared to be more similar to messages about ADM alone than messages about CBT alone. These findings tell us that the type of information that is provided to potential patients does have an effect on credibility and expectations, which may inform potential strategies for discussing treatment information with potential patients. The implications of this for future research are discussed in the future research section below.

Limitations

A key limitation of the study is that presentation of the treatment option messaging relied on brief videos (2 minutes). It is possible that longer or more interactive messages would have a greater impact. This may be particularly true for the information about combination treatment, as coverage of each treatment was even more limited. Similarly, it is possible that a 2-minute video may not be long enough to significantly reduce prognostic pessimism. This limitation of a short video length also applies to the emphasis on personalization. Perhaps a longer portion dedicated to personalization would have provided a more impactful message.

Another limitation arises from the study design. Participants were randomly assigned to seven conditions, a CBT condition, ADM condition, combination treatment condition, all with and without an emphasis on personalization, and a final control condition. While personalization did not appear to have an effect on the dependent variables, it is important to recognize this as a difference in experimental manipulation within conditions when discussing the primary outcomes. Additionally, there may be a lack of power to assess the moderation effects of preference on the outcome variables. This is due to the fact that the vast majority of participants

preferred CBT, and as a result most participants did not receive a video that matched with their preference.

The final limitation of this study is that a large number of tests were examined as part of the data analysis. For the primary outcomes, I assessed participants' expectations and views of the credibility of all three treatment options, to address the research question of how receiving information about one treatment option affected participants' views of all treatment options. As stated previously, Tukey's HSD was used to address the issue of Type I error, although this does not correct for the total number of tests used across the models examined. The caution needed in interpreting findings given the number of tests is all the more relevant to the exploratory analyses, which included a large number of tests.

Future Directions

Future studies should directly address the limitations of this study. Replication of the findings of this study would bolster confidence in the results. In future research, investigators might consider testing longer, more intensive messages. It would also be useful to generate messages that are designed to be as similar as possible to the messages patients would be likely receive in interacting with their primary care physicians. It is also important to consider a design which takes into account that preference for treatment will not be evenly distributed across the sample, to ensure that tests of the effects of preference will be powered adequately.

In addition to addressing the limitations of the study, future studies should expand on these findings to assess how different types of informational videos may affect the study variables. For example, future research could determine how variables such as the expertise of the narrator, the level of research-based information provided in the video, comparing the benefits of treatment options, or the use of actual marketing and other types of messages. These

changes could be used to examine the effect of practical, real-life examples of treatment information, which is important for informing how these messages impact potential patients directly.

Another goal of future research should be to examine how treatment information affects treatment seeking, adherence and outcomes. This study used credibility and expectations as dependent variables due to their established important in predicting treatment outcome. Assessing them directly will be incredibly valuable for addressing the issues of low treatment initiation, adherence and outcomes in the United States.

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Table 1

Demographic Information

Sex	Frequency	Percent
Male	116	38.67%
Female	174	58.00%
Prefer not to answer	10	3.30%
Gender	Frequency	Percent
Male	114	38.00%
Female	173	57.67%
Nonbinary	3	1.00%
Prefer not to answer	10	3.30%
Race/Ethnicity	Frequency	Percent
White	234	78.00%
Black	29	9.67%
Asian	22	7.33%
Hispanic/Latino	4	1.33%
Arab	1	0.33%
Mixed	5	1.67%
Native Hawaiian or Pacific Islander	1	0.33%
Prefer not to answer	4	1.33%
Income	Frequency	Percent
Less than $30,000	67	22.33%
$30,000 to $44,999	48	16.00%
$45,000 to $59,999	59	19.67%
$60,000 to $74,999	39	13.00%
$75,000 to $89,999	24	8.00%
$90,000 to $104,999	22	7.33%
$105,000 to $119,999	10	3.33%
Over $120,000	25	8.33%
Prefer not to answer	6	2.00%

Note. Gender, racial, and ethnic categories represent self-identifications chosen by participants

Table 2

Preference and Match/Mismatch

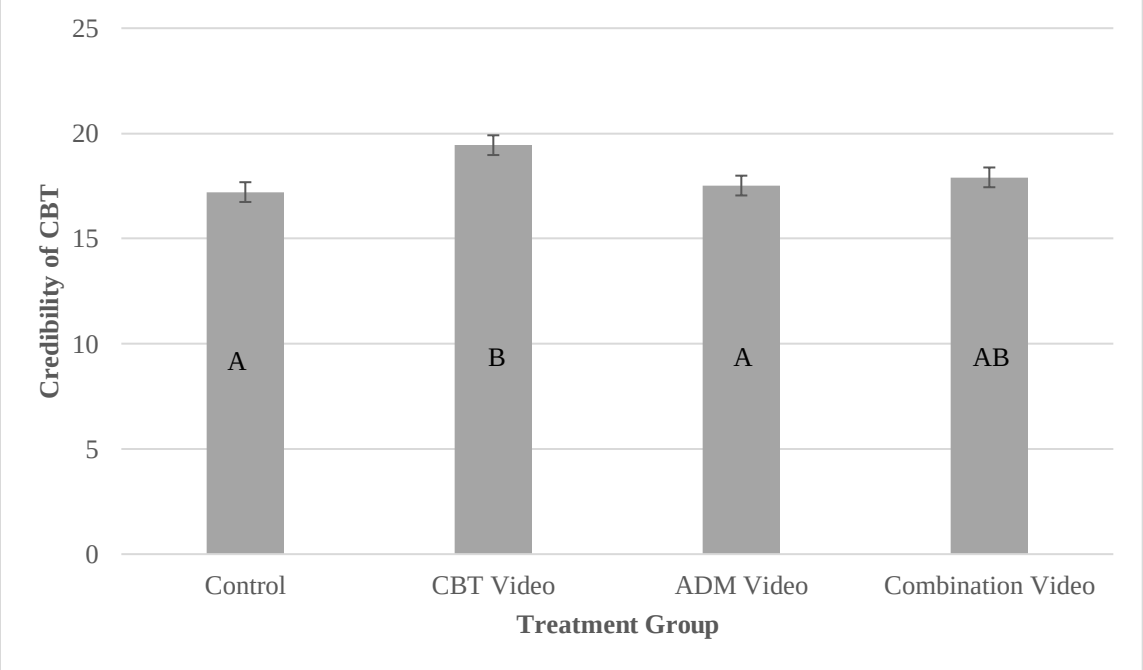
Preference		Frequency	Percent
CBT		143	47.67%
ADM		46	15.33%
Combo		111	37.00%
Match/Mismatch		Frequency	Percent
Mismatch		228	76.00%
Match		72	24.00%
Match/Mismatch Details	Prefer CBT	Prefer ADM	Prefer Combination
Control (N=75)	41	9	25
CBT Video (N=75)	35	10	30
ADM Video (N=75)	35	12	28
Combination Video (N=75)	32	15	28

Note. Match refers to participants receiving a video about the treatment option they preferred. The details section shows what combinations of preference and condition were present.

Figure 1

Panel A

Credibility of CBT by Condition



Note. Means have been adjusted for the level of the variable prior to the manipulation. Error bars shown represent standard error. Bars that share a letter represent nonsignificant differences according to Tukey's HSD.

Panel B

Credibility of CBT by Condition Effect Sizes (Hedges' g)

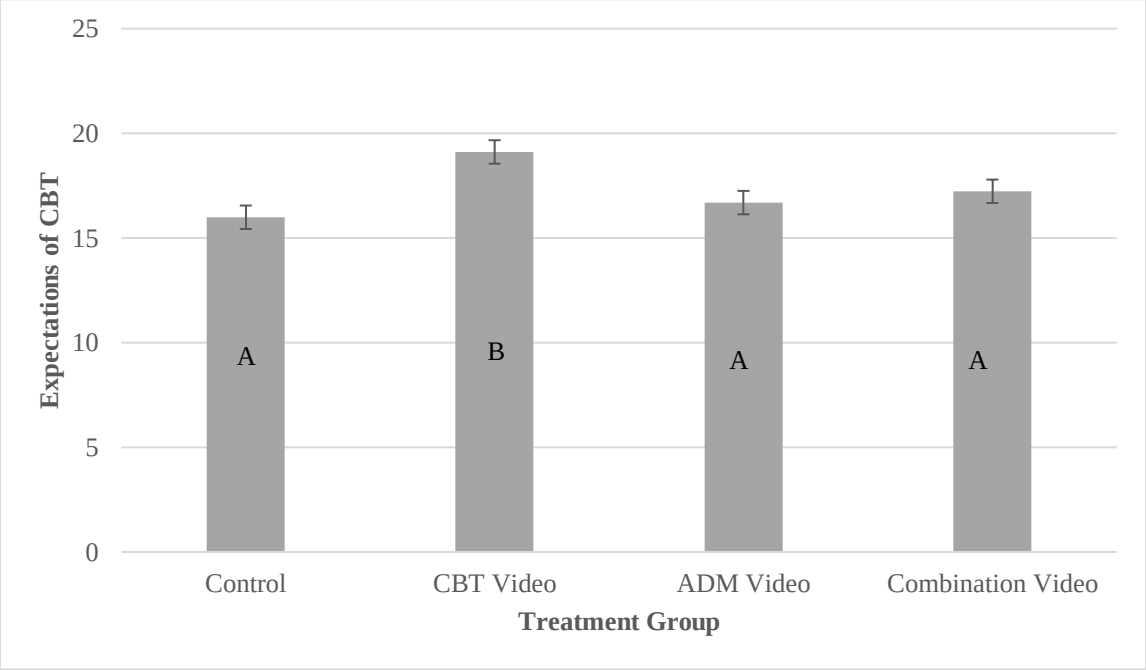
Contrast	Hedges' g
Control - CBT	-0.55
Control - ADM	-0.08
Control - Combo	-0.17
CBT - ADM	0.47
CBT - Combo	0.38
ADM - Combo	-0.09

Note. Small effect = 0.2. Medium effect = 0.5. Large effect = 0.8.

Figure 2

Panel A

Expectations of CBT by Condition



Note. Means have been adjusted for the level of the variable prior to the manipulation. Error bars shown represent standard error. Bars that share a letter represent nonsignificant differences according to Tukey's HSD.

Panel B

Expectations of CBT by Condition Effect Sizes (Hedges' g)

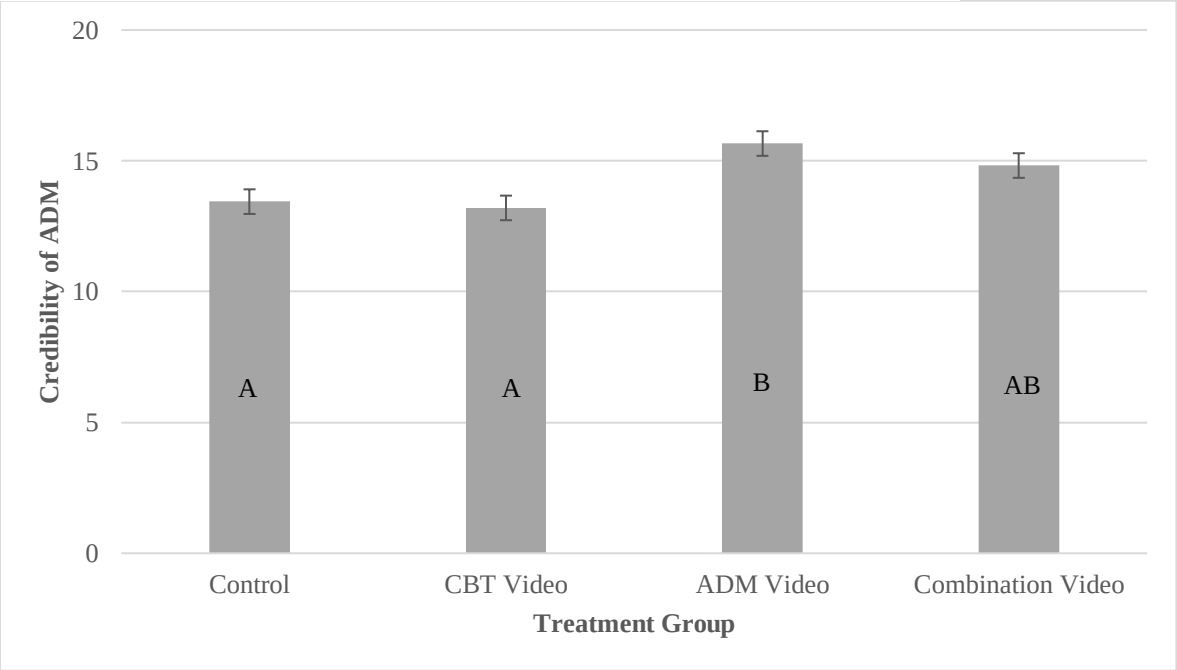
Contrast	Hedges' g
Control - CBT	-0.64
Control - ADM	-0.14
Control - Combo	-0.25
CBT - ADM	0.50
CBT - Combo	0.39
ADM - Combo	-0.11

Note. Small effect = 0.2. Medium effect = 0.5. Large effect = 0.8.

Figure 3

Panel A

Credibility of ADM by Condition



Note. Means have been adjusted for the level of the variable prior to the manipulation. Error bars shown represent standard error. Bars that share a letter represent nonsignificant differences according to Tukey's HSD.

Panel B

Credibility of ADM by Condition Effect Sizes (Hedges' g)

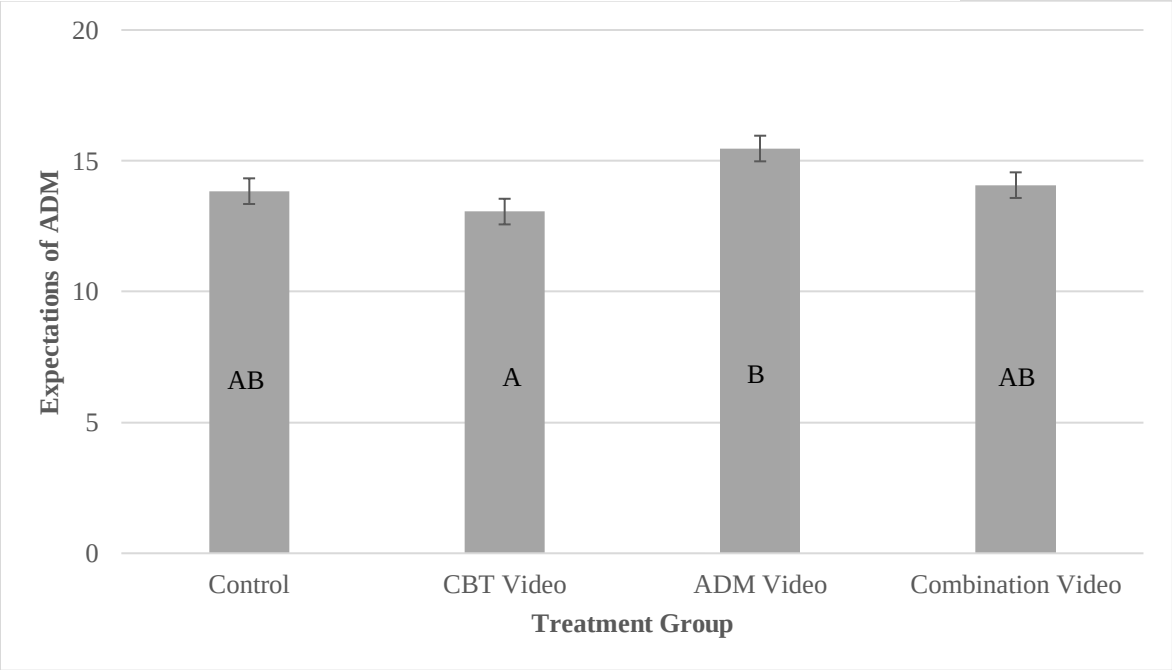
Contrast	Hedges' g
Control - CBT	0.06
Control - ADM	-0.54
Control - Combo	-0.34
CBT - ADM	-0.59
CBT - Combo	-0.39
ADM - Combo	0.21

Note. Small effect = 0.2. Medium effect = 0.5. Large effect = 0.8.

Figure 4

Panel A

Expectations of ADM by Condition



Note. Means have been adjusted for the level of the variable prior to the manipulation. Error bars shown represent standard error. Bars that share a letter represent nonsignificant differences according to Tukey's HSD.

Panel B

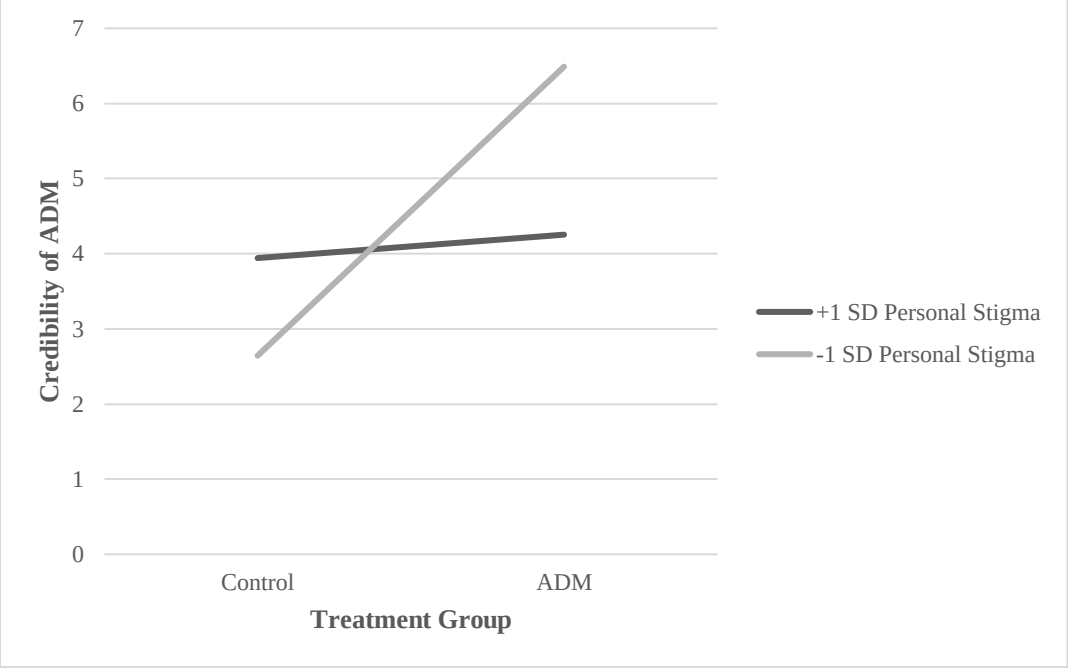
Expectations of ADM by Condition Effect Sizes (Hedges' g)

Contrast	Hedges' g
Control - CBT	0.18
Control - ADM	-0.38
Control - Combo	-0.05
CBT - ADM	-0.56
CBT - Combo	-0.23
ADM - Combo	0.32

Note. Small effect = 0.2. Medium effect = 0.5. Large effect = 0.8.

Figure 5

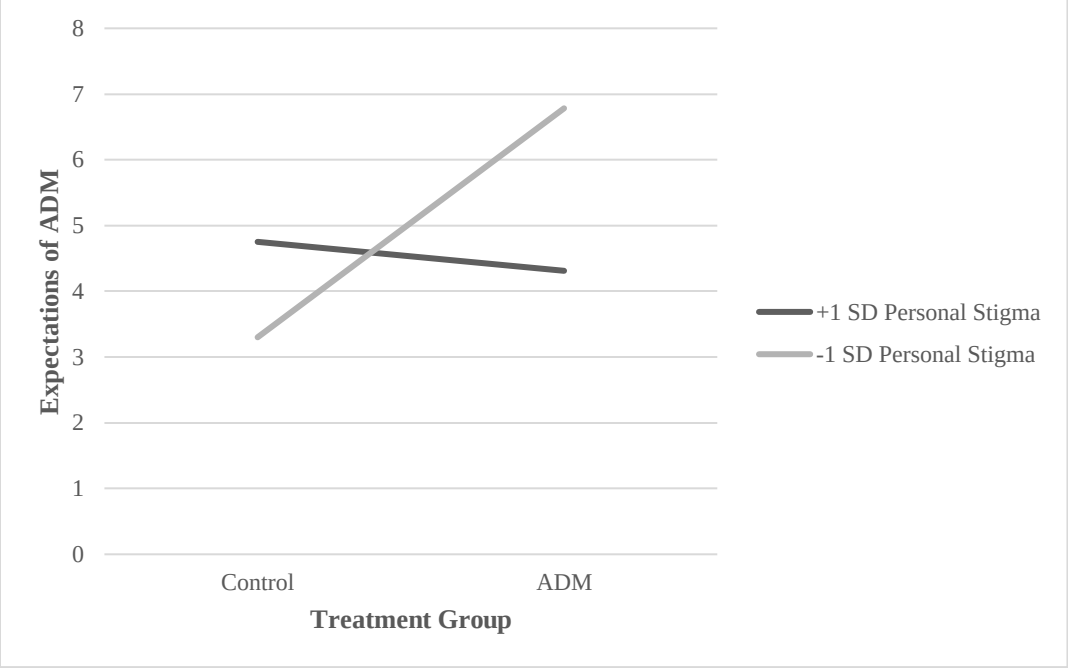
Personal Stigma as a Moderator of the Effect of Condition (viz. ADM vs. Control) in Predicting Credibility of ADM



Note. Model predicted values for credibility of ADM are shown for those in the ADM and control groups and those with a personal stigma score 1 SD above and 1 SD below the mean

Figure 6

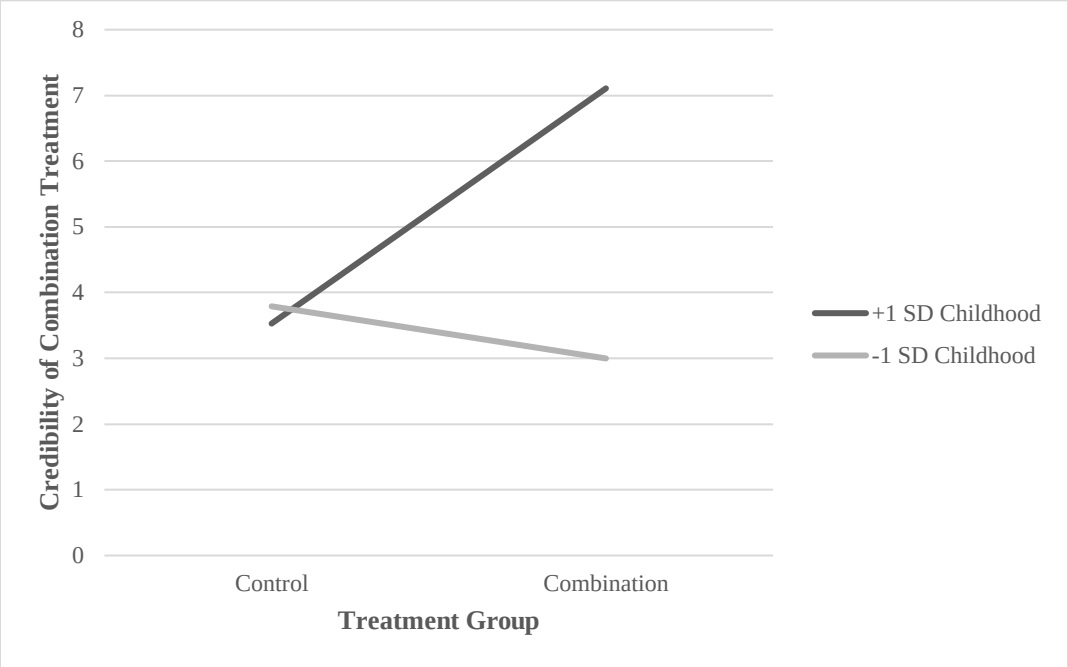
Personal Stigma as a Moderator of the Effect of Condition (viz. ADM vs. Control) in Predicting Expectations of ADM



Note. Model predicted values for expectations of ADM are shown for those in the ADM and control groups and those with a personal stigma score 1 SD above and 1 SD below the mean

Figure 7

Childhood Rationales for Depression as a Moderator of the Effect of Condition (viz. Combination Treatment vs. Control) in Predicting Credibility of Combination Treatment



Note. Model predicted values for credibility of combination treatment are shown for those in the combination treatment and control groups and those with a childhood rationales for depression score 1 SD above and 1 SD below the mean